indeed

Patterns, Not Categories: Learning Across Incidents

Tanner Lund

2023

Watch for Patterns

What do you see that could apply to your own systems? (share in slack)

indeed

Categories Have Limitations

"Is a hot dog a sandwich?"
"Is the ocean a soup?"

Learning Across Incidents is Good ™

A List of Post-mortems!

Table of Contents

- **Config Errors**
- **Hardware/Power Failures**
- **Conflicts**
- **Time**
- **Database**
- **Uncategorized**
- **Other lists of postmortems**
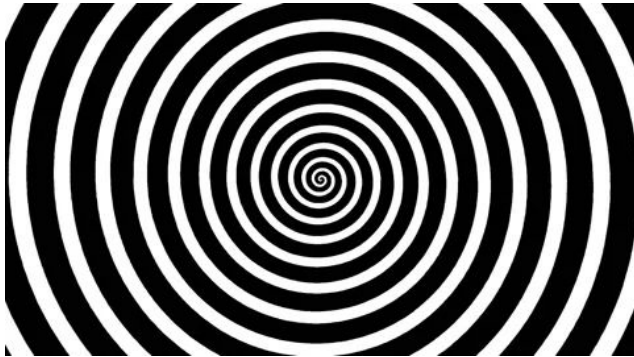- **Analysis**
- **Contributors**

Categories from danluu's repository:
https://github.com/danluu/post-mortems

But It's Hard

A List of Post-mortems!

Table of Contents

Categories from danluu's repository:
https://github.com/danluu/post-mortems
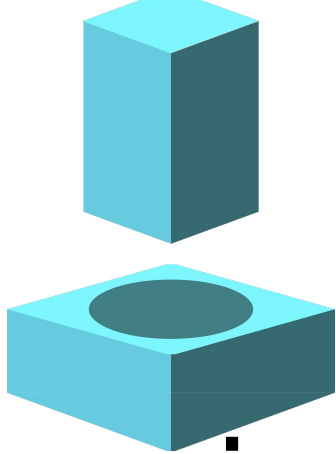
Do the categories serve us?

Or do we serve the categories?

2020 Hypothesis #2

"At least 50% of S4A incidents will have a high avoidability"

Avoidability being:

"How easily could S4A developers/operators have avoided this with pro-active work. Did we see it coming, and fail to act, or was this an unpredictable event? 1-5 scale, 1 being a very hard event to see coming, 5 being an inevitable event that was identified before it happened."

https://www.youtube.com/watch?v=cKurUbYvWLA&list=PLQmwzq_GIU-idCnJNR4t_aKb0HDCOXfZ1&index=20
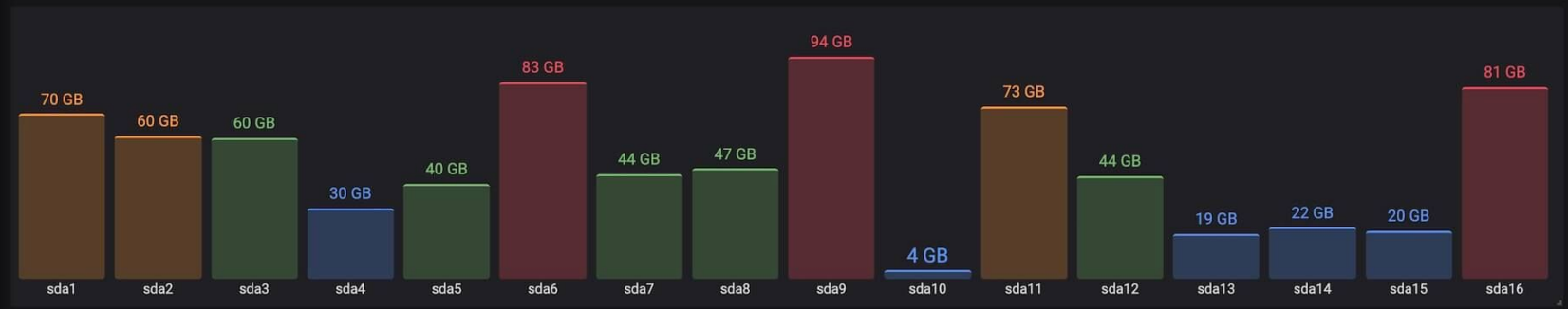
"And??"

"What do you want me to do about it?"

Repeat Incidents

indeed

People are Built for Pattern Recognition

Last 1 hour

Memory / CPU ▾

25 B — 25%
20 B — 20%
15 B — 15%
10 B — 10%
5 B — 5%
0 B — 0%

14:20 14:30 14:40 14:50 15:00 15:10

■ memory   ■ cpu

logins
⊘ timeshift -1h

70
60
50
40
30
20
10

13:20 13:30 13:40 13:50 14:00 14:10

■ logins   ■ logins (-1 hour)

Memory
80 B

Sign ups
275

Logouts
161

Sign outs
279

server requests

150
125
100
75
50
25
0

14:20 14:25 14:30 14:35 14:40 14:45 14:50 14:55 15:00 15:05 15:10 15:15

■ web_server_01   ■ web_server_02   ■ web_server_03   ■ web_server_04

client side full page load

5.0 s
4.0 s
3.0 s
2.0 s
1.0 s
0 ms

14:20 14:30 14:40 14:50 15:00 15:10

70 GB 60 GB 60 GB 30 GB 40 GB 83 GB 44 GB 47 GB 94 GB 4 GB 73 GB 44 GB 19 GB 22 GB 20 GB 81 GB

sda1 sda2 sda3 sda4 sda5 sda6 sda7 sda8 sda9 sda10 sda11 sda12 sda13 sda14 sda15 sda16

Jumping Into An Incident

Jumping Into An Incident

Jumping Into An Incident

Jumping Into An Incident

Jumping Into An
Incident

Jumping Into An Incident

Christopher Alexander

Pattern Theory

Some Example Principles

- Strong Centers
- Levels of Scale
- Boundary
- Alternating repetition
- Positive space (complementarity)
- Good form
- Local symmetry
- Deep interlock (ambiguity)
- Contrast (difference)

- Gradient
- Roughness (individuality)
- Echoes (similarity)
- The void (open space)
- Simplicity and inner peace
- Non-separateness (connectedness)

Pattern Concept

Abstraction

Christopher Alexander (Architecture)
pattern name
internal ranking
picture
context
problem
forces
solution
resulting context

Rob Hopkins (Transition)
pattern name
picture
challenge
solution

Peter Baumgartner (Education)
pattern name
picture
context
problem
forces
solution
stumbling blocks
pros & cons
examples
user roles
tools
related patterns
references

(Site Reliability)
pattern name
context
??
solution
??

Thomas Leitner -
https://patternsofcommoning.org/working-with-patterns-an-introduction/

Mobility Corridor

…In a Polycentric Region, develop proper high-speed connections between the centers of the region as well as to other regions.

Problem-statement: There is a need for corridors that allow high-speed vehicular movement within and between cities. This need extends into the hearts of the cities. But these structures must not be allowed to sever and destroy the tissue of the city.

❖ ❖ ❖

Discussion: Few structures have been more damaging to modern cities than freeways. Yet the solution of creating freeway bypasses on the outskirts of cities is equally disastrous — sapping the centers of commercial movement and activity, and at the same time generating new sprawling zones at the edges.

Grade-separated mobility corridor in Paris: Place de l'Europe over a railway line.

This is not a unique problem of the automobile age. Railways can be no less destructive of urban areas, and so can canals, rivers and other structures — in fact, any structure that significantly interrupts the connectivity and flow of pedestrians is likely to be problematic. But there are excellent examples of cities that have managed this problem, by separating the grades of the mobility corridors, and by creating a

continuous fabric of connections across them. Examples can be seen in London, Paris, and many other mature cities.

The issue is not whether a mobility corridor is present, but whether the urban fabric surrounding it remains intact. This must be done carefully, maintaining a continuous, tight fabric with minimal intrusion of noise, emissions, and visual disorder. Examples like Place de l'Europe in Paris demonstrate the value of ample vegetation, fences and other screening devices. Some cities have simply taken their mobility corridors underground, like Oslo. Some cities bring buildings across the bridging structures, like the Ponte Vecchio in Florence.[1]

One problem for many cities is the cost of excavation and retaining structures. One strategy to minimize this cost is a "balanced cut and fill" grade change, rising gently in the urban fabric to the edge of the mobility corridor, and then cut more deeply to accommodate travel lanes at a lower grade. A related strategy is to utilize existing natural

A related strategy is to utilize existing natural watershed grade changes, taking care to avoid water pollution from vehicle emissions and other toxic runoff. Because of the cost of excavation, many cities in recent decades have chosen the easier alternative, which is to raise highways and heavy transport tracks above the pedestrian urban fabric. But the evidence shows that there is a profoundly negative impact of such solutions on the urban life underneath them.[2]

Of course, it must be stressed that "mobility" is not just about high speed transportation, but about integrated mobility across multiple modes (see Walkable Multi-Mobility, 2.1). A coordinated strategy is needed to keep a balanced and integrated approach to mobility.[3]

❖ ❖ ❖

Therefore: Do not push freeways, railways and other destructive activities to the edges of the city. Instead, find ways to integrate them into the urban fabric with minimal disruption, using careful grade-separating strategies. Assure that the streets above are continuous, walkable, and as protected as possible from negative impacts like noise and emissions. Plan for at least two major mobility corridors crossing each large urban area, and connecting to others.

Integrate mobility corridors into the network, maintaining a 400M Through Street Network across all interruptions, providing bridges and other connections…

notes

[1] For a discussion of this concept in relation to urban mobility networks, see Mehaffy M.W., Porta, S., Rofè, Y. and Salingaros, N. (2010), Urban nuclei and the geometry of streets: The 'emergent neighbourhoods' model. Urban Design International, 15(1), 22-46. Available on the Web at https://tinyurl.com/yy98o68y

[2] The damaging effects of such structures has been discussed extensively, and perhaps most notably by Jane Jacobs in The Death and Life of Great American Cities (1961, New York: Random House). She referred to the consequences as "galloping gangrene."

etc.…

(This is just an example of one approach)

http://npl.wiki/view/welcome-visitors/view/growing-regions/view/patterns-of-scale/view/regional-patterns/view/mobility-corridor

Not a "Runbook"

Not "Best Practices"

Patterns in Software

- Object-Oriented Programming
- "Design Patterns"

What about design patterns at the system level?

You Are (Part of) The System

Ward Cunningham

Wiki
"Technical Debt"
XP
Design Patterns (general)

Federated Decisions

Local Expertise

"Involve the customer in design"

They more clearly see the costs and trade-offs

Pair Programming

Spread expertise and reduce dependency

Dave Woods,

Richard Cook,
Others…

STELLA Report

STELLA

Report from the SNAFUcatchers Workshop on Coping With Complexity

Brooklyn NY, March 14-16, 2017

Winter storm STELLA

Woods' Theorem: *As the complexity of a system increases, the accuracy of any single agent's own model of that system decreases rapidly.*

Dave's Homework

- Learn how to learn about patterns
- Identify some patterns
- Share patterns with each other!

II. PATTERN-CENTERED INQUIRY

"Each pattern describes a problem which occurs over and over again in our environment, and then describes he core of the solution to that problem in such a way that you can use this solution a million times over, without ever doing it the same way twice."

(Alexander et al., 1977, p. x)

Key insight—relationships captured in a pattern *recur* even as the elements that specify the pattern change.

The pattern is general but is expressed/ instantiated in multiple different situations/ settings.

Patterns generalize & transfer findings from one situation to others.
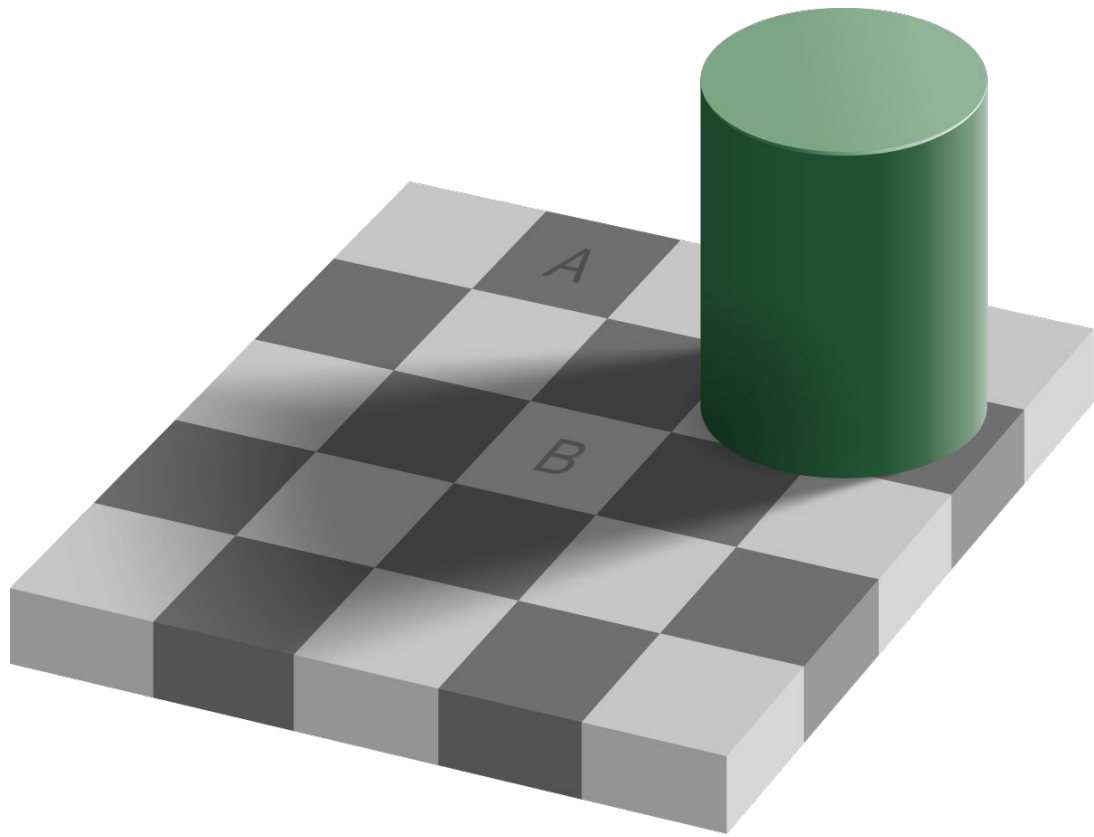
Patterns are a way of seeing things across multiple events we cannot see from one
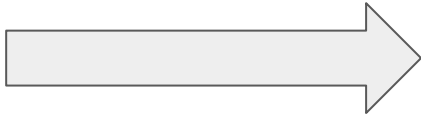
indeed

Patterns of How Systems Adapt

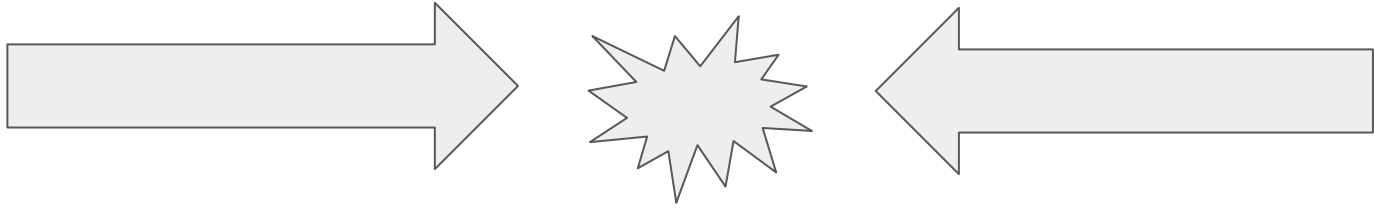"Write that down, write that down!"

Big to Small

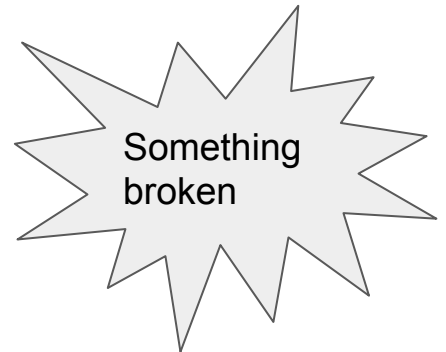Law → Pattern → Local Expression

Working at Cross Purposes

Law

Team 1

Team 2
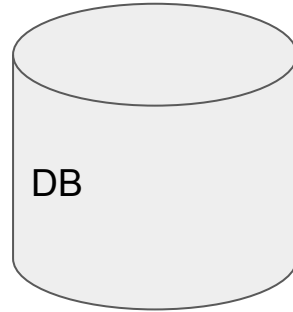
Team 3
(different
timezone)

Fragmentation Across Unit Boundaries

General Pattern

Something
broken

Multi-Party Problem

General Pattern

Product
Team

Platform

Platform
Team
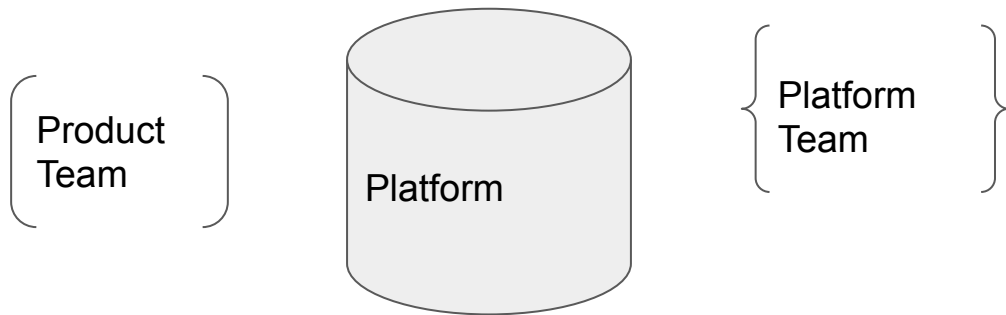
Multi-Party Problem

General Pattern

Alex Elman & Sarah Butt: **"Embracing the Multi-Party Dilemma: Learning From Incidents Across Company Boundaries"**
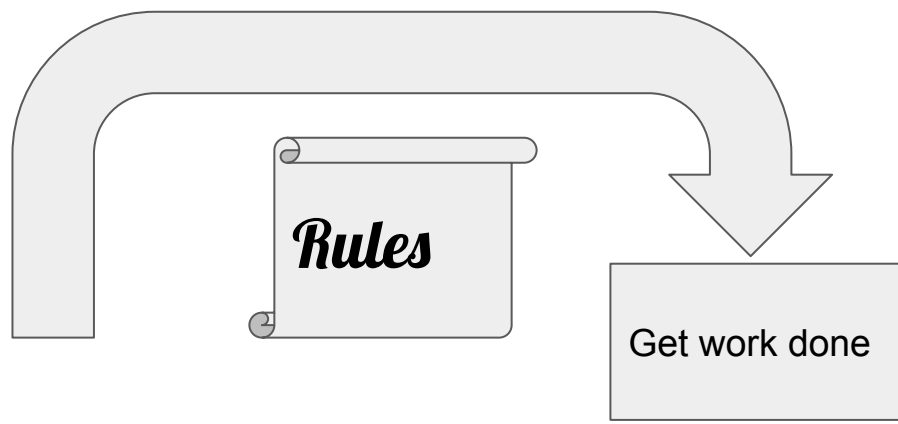
Clumsy Automation

Pattern

Clumsy Automation

- The Sorcerer's Apprentice
- Jimmy Neutron
- "To err is human. To propagate error to all server in automated way is DevOps" - DevOps Borat
- That-breakfast-making-machine-from-Chitty-Chitty-Bang-Bang
- Cleaning robot that cleans *the wrong things*
- **"Ironies of Automation"**

Workarounds

Pattern

Pattern Priming

Recognize examples of patterns in your setting. Start noticing.

Pattern Finding
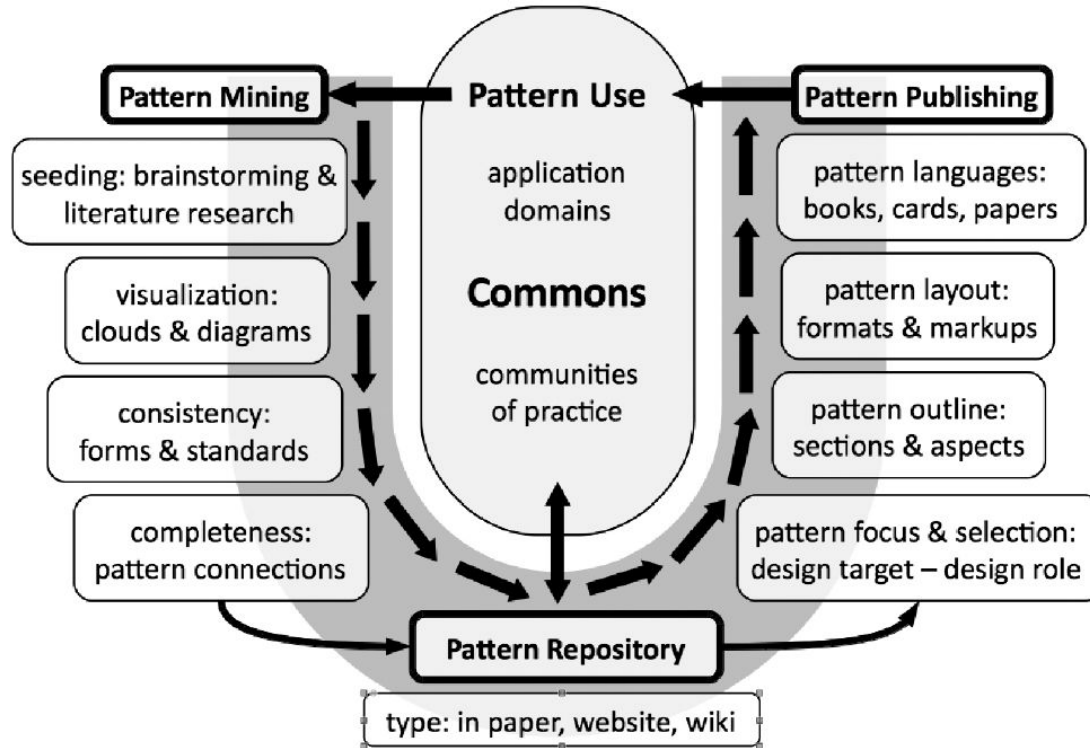
Discover patterns from the things you keep seeing.

Family home: a generic pattern with infinite variations

What's an SRE example?

"The people affected should be involved in the design process"

Don't throw work on a backlog unilaterally

Pattern Mining
- seeding: brainstorming & literature research
- visualization: clouds & diagrams
- consistency: forms & standards
- completeness: pattern connections

Pattern Use
application domains

Commons

communities of practice

Pattern Publishing
- pattern languages: books, cards, papers
- pattern layout: formats & markups
- pattern outline: sections & aspects
- pattern focus & selection: design target – design role

Pattern Repository

type: in paper, website, wiki

https://patternsofcommoning.org/working-with-patterns-an-introduction/

Predictive Power

Does your theme or pattern help you predict? Identify something early? React appropriately to a situation?

Categories are generally XOR. We are not so rigid.

Share your expertise!

Pull things out of your experts' heads and share them around to help others

Handout!

- Links to resources
- Some possible patterns
- Talks cited in this one
- *SURVEY FOR COLLECTING PATTERNS*
- My soundcloud link
- Contact information

What have you(r experts) noticed?

(Weak signals ok)